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Do-not-resuscitate orders and high-risk pediatric surgery: professional nuisance or medical necessity?

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ABSTRACT

Background: There is a paucity of data in the literature regarding end-of-life care and do-not-resuscitate (DNR) status of the pediatric surgical patient, although invasive procedures are frequently performed in very high risk and critically ill children. Despite significant efforts in adult medicine to enhance discussions around end-of-life care, little is known about similar endeavors in the pediatric population.

Methods: A retrospective review of the National Surgical Quality Improvement Program Pediatric database was performed. Patients aged <18 y with American Society of Anesthesiologists class 3 or greater who underwent elective surgical procedure in 2012-2013 were included. Demographic factors, principal diagnosis, associated conditions, DNR status, and mortality were extracted. Descriptive analysis was performed.

Results: A total of 20,164 patients met the inclusion criteria. Only 36 (0.2%) patients had a signed DNR order before surgical procedure. Of severely ill American Society of Anesthesiologists four patients, only 1% had DNR status. There were no differences in gender, race, ethnicity, or surgical specialty by the presence of a DNR order. Notably, 17.1% of children who died within this period had multiple surgical procedures performed before expiring.

Conclusions: The rate of documented DNR status is extremely low in the high-risk pediatric surgical population undergoing elective surgery, even among severely ill children. Well-informed end-of-life care discussions in a patient-focused approach are essential in the surgical care of children with complex medical conditions and critical illness. Better documentation of DNR discussion will also allow better tracking and benchmarking.

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Introduction

nd-of-life care discussions are challenging in any scenario, but when the patient is a child, conversations regarding do-not-resuscitate (DNR) orders become substantially more difficult. Even in situations of terminal illness, it is uncommon for a child to be made DNR status. A retrospective review of children who died from malignancy found that fewer than half of patients had a DNR order or physician orders for life-sustaining treatment in the final stages of their disease.[1] Review of hospice data has demonstrated that children on hospice are half as likely as adults to have a DNR order in place, and among a large cohort of pediatric hospice patients only 39% had DNR status.[2]

Surgeons are frequently asked to perform procedures in critically ill children and must weigh the risks of these interventions with the potential benefit for the patient. As many as 15% of adult patients with DNR orders undergo surgical procedures.[3] In a more recent study, 63% of adult patients with a DNR order had nonemergent surgery and DNR status was deemed an independent predictor of poor surgical outcome.[4] There is a paucity of similar data on DNR status among children undergoing surgery.

This study therefore aims to assess the prevalence of DNR orders in critically ill pediatric surgical patients, to better understand the current environment, and highlight opportunities for improvement in the care of the sick child.

Materials and methods

Data source and study population

This is a retrospective analysis of a prospectively collected large national data set. We queried the American College of Surgeons National Surgical Quality Improvement Program Pediatric (NSQIP-P) database for the period January 1, 2012 to December 31, 2013. NSQIP-P is a multi-institutional program focused on quality assessment that provides risk-adjusted 30-d postoperative outcomes tailored to the pediatric surgical population. Each member institution pays a participation fee and hires a clinical reviewer to abstract data. More than 300 variables are collected per case and include demographics, preoperative and intraoperative variables, and discharge and readmission data. These data can then be used for benchmarking and quality improvement purposes.

All patients who underwent elective procedures with American Society of Anesthesiologists (ASA) class 3 or greater were included for analysis. ASA class 3 refers to patients who have severe systemic disease, class 4 to patients with severe systemic disease that is a constant threat to life, and class 5 to moribund patients who are not expected to survive without a surgical procedure. Demographic factors, principal diagnosis, associated conditions, DNR status, and mortality were extracted.

Statistical analysis

Consecutive patient records were reviewed over the specified time period. Demographics, DNR status, and mortality were descriptively analyzed. Categorical data are reported as frequencies and continuous variables as median (interquartile range [IQR]). Univariate analysis was performed using the chi-square test for categorical variables and student's *t*-test for continuous variables. STATA version 10 (StataCorp, College Station, TX) was used for analysis and a *P* value less than 0.05 was considered statistically significant.

Results

Patient characteristics

A total of 20,164 patients met the inclusion criteria of ASA class 3 and greater. Median age of the study sample was 4.6 y (IQR = 0.7-11.7). As shown in Table 1, most patients were male, White, and had inpatient status. There were no significant differences in age, gender, race or ethnicity between DNR and non-DNR patients. DNR patients were more likely to be inpatients, admitted through the emergency room, or transferred from an acute or chronic care facility than non-DNR patients.

Of 20,164 patients, only 36 had DNR status (0.2%). Patients with DNR status were most commonly operated on by pediatric general surgeons (66.7%), followed by pediatric neurosurgeons (16.7%) and pediatric orthopedic surgeons (11.1%). The median postoperative length of stay for DNR patients was 6.5 d (IQR = 2.3-21). Length of stay was 14 d or longer in 33.3% of DNR patients.

There were no differences in the prevalence of cardiac disease, diabetes, preterm birth, central nervous system

Table 1 – Demographic characteristics of overall population.

Characteristic	% DNR ($n = 36$)	% Non-DNR ($n = 20{,}128$)	*P* value
Male	52.8	54.7	0.82
Race			
White	69.4	70.1	
African American	11.1	15.4	
Asian	0.0	2.5	0.32
Other	2.8	0.7	
Unknown	16.7	11.3	
Hispanic ethnicity	11.1	11.3	0.90
Admission status			
From home	50.0	76.7	
Through emergency room	19.4	8.4	
Transfer from outside hospital	25.0	11.6	0.002
Chronic care or rehab facility	2.8	0.6	
Surgical service			
Pediatric surgery	66.7	44.3	0.71
Other	33.3	55.7	
Inpatient procedure	94.4	80.8	0.04